2.0 ALTERNATIVES

2.1 Alternative Selection Process

In 1956, Douglas County (County) began investigations of possible alternatives for providing an adequate water supply for the needs in Elk Creek subbasin (Bureau of Reclamation, 1956). The long period of investigation and study reflects the difficulty of finding solutions to meet existing and future water needs in the Elk Creek subbasin. Various studies were initiated including mapping, aerial photogrammetry, geological and physical characterization, evaluation of water needs of the service areas, costs of construction and operation, and environmental conditions. In these investigations, County consulted and cooperated with federal, state, and local agencies, and the public to determine their concerns and to solicit their comments and expertise (See: Section 4, Consultation and Coordination).

The selection of alternatives to be investigated in the Elk Creek subbasin was based primarily on the following criteria:

- Geologic integrity of storage site.
- Adequate water yield at each alternative site.
- Storage sites having capacities up to 50,000 acre-feet to provide for the anticipated needs for fisheries, municipal, industrial, irrigation, and flood control.
- Service to two major agricultural valleys (Scotts and Yoncalla).
- Anticipated adverse impacts to the area including loss or decrease of service area, cost of relocation of highways and utilities, unavoidable loss of natural resources, and changes in land use.
- Municipal and industrial water needs of the cities of Drain and Yoncalla.
- Acceptability to the public.
- Capability of providing new water-based recreational activities.
- Cost effectiveness (financially feasible to the County).
- Site must be high in the watershed, to lessen, as much as possible, the impacts on the spawning habitat of anadromous fish.

- The project must provide the potential for improving anadromous fisheries habitat.

The alternative selection process evolved over a 35-year period. The process considered sites of varying storage capacities for structural alternatives. The structural alternatives consisted of storage sites for construction of a dam, reservoir, and appurtenant facilities. Other alternatives considered were interbasin transfers of water and pumping from ground water sources. Non-structural alternatives considered were water conservation and retirement of irrigation land.

Using the above criteria, and after collection of necessary data and performing studies to determine the physical conditions of all alternatives, the preferred alternative was selected, because:

- Estimated water yield above the damsite is adequate for present and future needs.

- The site would have a storage capacity of 24,143 acre-feet, capable of providing the present and anticipated needs for fisheries habitat enhancement, municipal and industrial water, rural domestic water, and irrigation water. It would also provide some flood control.

- The site would provide irrigation capabilities to 4,661 acres of agricultural lands in Scotts Valley and Yoncalla Valley, and lands adjacent to the lower reaches of Elk Creek.

- The site is geologically acceptable.

- The site would provide adequate year-long water for municipal and industrial use in the cities of Yoncalla and Drain and in the community of Rice Hill, and numerous rural residences.

- The site is overwhelmingly acceptable to the public.

- The site is high in the watershed and would eliminate only 4 1/2 miles of anadromous fish habitat. Fish habitat would be enhanced on 39 miles of stream below the reservoir.

- The site would result in minimal adverse impacts to existing land use, transportation systems, and rural residents. However the site would result in the loss of 260 acres of grass pasture land, 364 acres of commercial forest land, and 681 acres of wildlife habitat. The latter would be mitigated.

- Construction and operation of the site would be cost-effective.

- The 681 acre reservoir would provide new opportunities for flat-water recreation of boating, and fishing, and waterfowl hunting.

- The reservoir and adjacent areas would provide new habitat for eagles and osprey.

- Operation of the project would provide opportunities for industrial diversification and urban growth.

- The project would improve water quality, and alleviate adverse water quality conditions caused by waste discharges in the Elk Creek subbasin.

- Arable lands which meet wetlands criteria would be excluded from the project service area.

The preferred alternative would meet all of the municipal and industrial water needs through the year 2030, and perhaps beyond. Instream habitat for anadromous fish would be enhanced between the dam and the mouth of Elk Creek and in the lower reaches of Yoncalla Creek and Adams Creek. The irrigation component would meet all of the supplemental irrigation needs. It would not necessarily provide enough water to develop all arable lands, but would meet needs of those showing interest through owner surveys. The preferred alternative would provide a reduction in the flood level in the city of Drain.

Under the Bureau of Reclamation Small Reclamation Projects Act of 1956 (SRPA) and the Douglas County Water Resources Management Program (Douglas County, 1989), the County has determined that the Preferred Alternative is financially feasible. The municipal and industrial and flood control proposals are cost efficient. The fishery proposal would be cost efficient since the project would result in decreasing downstream temperatures within the biological needs for anadromous fish rearing in Elk Creek.

Mitigation of project impacts on wildlife is achievable. A mitigation proposal has been developed in cooperation with the Fish and Wildlife Service, National Marine Fisheries Service, and Oregon Department of Fish and Wildlife. The proposal contains elements to mitigate or avoid wetland habitat losses which is a national priority. One mitigation element includes securing habitat for the endangered Columbian white-tailed deer. Under Federal formulation criteria (which would require only minimum basic facilities), the proposed recreation developments would not be cost-effective. However, the level of recreation development desired by the county makes the increment financially feasible (Bureau of Reclamation,

1991).

The preferred alternative has received acceptance at the local level. Local demand for such a project has been voiced since about 1955 (See: Section 1.0, Purpose and Need). Those who would be most immediately affected, residents of the area that would be inundated, support the project. The environmental community has been notified of the project. No opposition has been identified. State and Federal fish and wildlife agencies have been involved in formulating the project. Those agencies have not expressed adverse reactions.

Basic elements of the preferred alternative have received public review through the Douglas County Comprehensive Plan development process (Douglas County Planning Department, 1989). The preferred alternative meets the objectives of the Comprehensive Plan, since it would partially fulfill the County's economic development goal. The alternative is also compatible with existing State and local laws and regulations.

2.2 Preferred Alternative

2.2.1 Purpose

A project at the Milltown Hill Dam site (Figures S-1 and 2-1) would serve portions of Elk Creek subbasin downstream from the site. It would, primarily, provide water for anadromous fish, municipal, industrial, rural domestic, and irrigation uses. Secondary benefits would include resident fish and wildlife habitat enhancement, flood control, new recreational opportunities, and water quality enhancement.

2.2.2 Description

2.2.2.1 Dam

The project would consist of a 24,143 acre-foot reservoir at river mile 39.4 on Elk Creek (See: Appendix A for drawings of the dam). A 186 foot-high dam (hydraulic height) would inundate 681 acres of land at the 775 foot mean sea level (msl) elevation at normal (full) pool. The reservoir would impound about 4 1/2 miles of Elk Creek and 2 miles of tributaries (Table 2-1 and Figure 2-2). Excavation for construction of the dam would require removal of approximately 300,000 cubic yards of overburden and rock. The material would be backhauled and used for the fill required for the relocation of Scotts Valley road at the south end of the reservoir and for development of the recreation areas (Bureau of Reclamation, 1991).

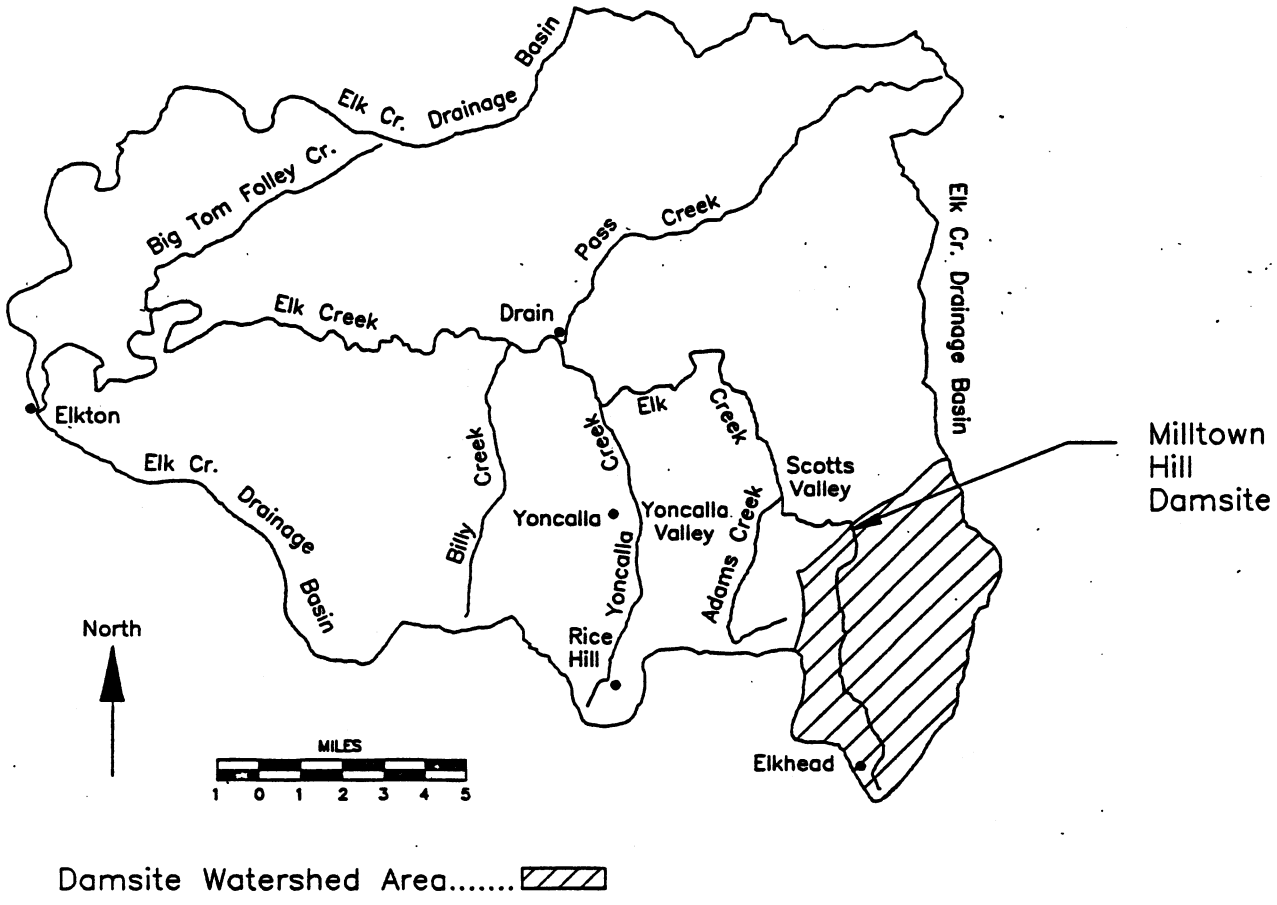


Figure 2–1
Milltown Hill Project
Milltown Hill Watershed

Table 2-1. Description of Milltown Dam and Related Facilities.

DAM TYPE	
Roller-compacted concrete gravity	
Structural height	186 feet
Hydraulic height	179 feet
Crest elevation	786 feet msl
Crest length	1,050 feet
Crest width	17 feet
Downstream slope	0.75:1
Upstream slope	Near Vertical
Volume 234,000 cubic yards	
SPILLWAY	
Type	uncontrolled center overflow
Crest elevation	775 feet msl
Spillway crest length	100 feet
Spillway capacity (inflow design flood)	15,235 cubic feet/second
OUTLET WORKS	
Multilevel structure	
Type	Single tower, moveable inlet
Outlet conduit size	1-36 inch diameter
Operating range (sill/elevation)	Elevation 765 to 720 feet msl
Low level structure	
Type	Conventional-stationary
Outlet conduit size	1-48 inch diameter
Inlet elevation	650 feet msl
Maximum capacity	600 cubic feet/second
Bifurcations	Pressure pipeline
	Hydroelectric stub
Valves	1 fixed cone outlet valve
	4 butterfly control valve
DIVERSION WORKS	
Type	Temporary-to be plugged after construction
Conduit size	5-foot diameter
Maximum capacity	400 cubic feet/second with cofferdam
STORAGE	
Total capacity	24,143 acre-feet
Dead (107 ac-ft) and inactive capacity (393 ac-ft)	500 acre-feet
Municipal and industrial	937 acre-feet
Irrigation	9,654 acre-feet
Flow for anadromous fish and temperature control	7,737 acre-feet
Carryover	5,315 acre-feet
Reservoir length (full pool)	4.5 miles
Shoreline (full pool)	13.2 miles

Source: Bureau of Reclamation, 1991.

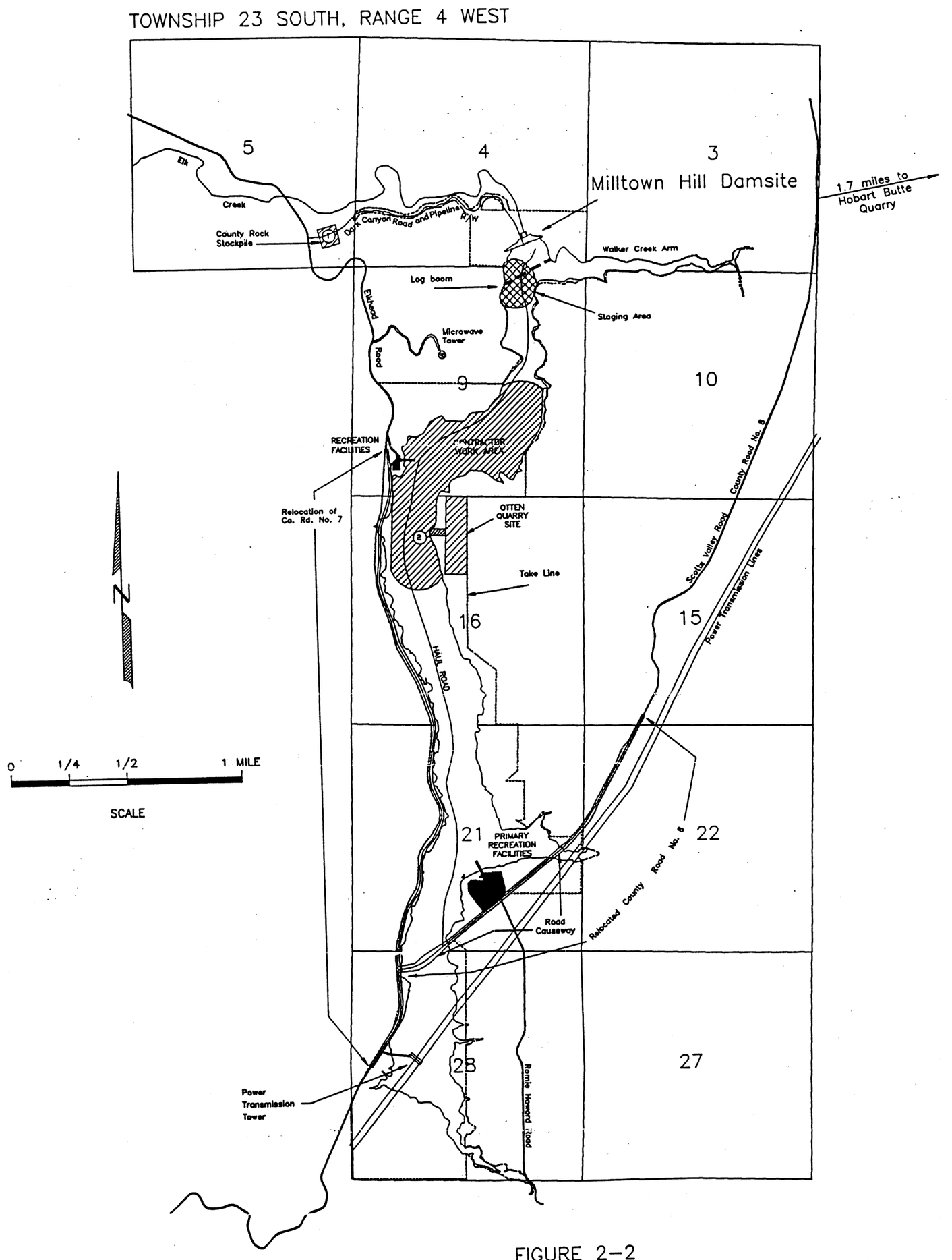


FIGURE 2-2
MILLTOWN HILL PROJECT
PROJECT FEATURES

2.2.2.2 Storage Allocations

The reservoir would have a total storage capacity of 24,143 acre-feet, allocated among its principal uses (Table 2-1). The active storage allocation would be made as follows: anadromous fisheries and water temperature control: 7,737 acre-feet; municipal and industrial: 937 acre-feet; and irrigation: 9,654 acre-feet; (Bureau of Reclamation, 1991). About 107 acre-feet of the 500 acre-feet of dead and inactive storage is not accessible since it is below the sill of the low level intake at 650 feet (msl). The 5,315 acre feet of carryover could allow filling of the reservoir during the following year depending on water year. Based on an area capacity curve (See: Appendix A), area and storage at normal full pool, average drawdown, and maximum drawdown are as follows:

POOL	Elevation	Surface Area	Storage
Normal Full pool	775 feet msl	681 acres	24,143 acre-feet
Average drawdown (annual)	736 feet msl	256 acres	6,193 acre-feet
Maximum drawdown (drought)	688 feet msl	22 acres	543 acre-feet

The project would not affect prior water rights, including instream water rights to protect aquatic resources.

2.2.2.3 Intake Structure

The intake structure for the low level outlet would consist of a rectangular shaft with a horizontal sill at elevation 650 (See: Appendix A). A trashrack would be mounted above the sill. A square bellmouth would be provided at the entrance, on the face of the dam. A bulkhead gate would be provided for dewatering. The sill would be located at elevation 650 to provide adequate protection for the inlet. The intake would be high enough to provide protection from siltation for up to 100 years.

The variable depth intake would operate between sill elevation 765 and elevation 720. The inlet structure would consist of a reinforced concrete and steel sleeve, fixed to the lower portion of the dam, and an upper steel pipe section capable of sliding vertically in the sleeve. The inlet, which is fixed to the upper steelpipe, would consist of a converging "funnel" drop type intake having a trashrack above. Due to trashrack and inlet submergence requirements, the inlet sill would operate through a range that is at least 10 feet below these elevations. In the fully raised position (sill elevation 765), approximately 5 feet of pipe would

remain in the lower sleeve. A bulkhead gate would not be provided for the water quality intake, since the inlet can be raised out of the reservoir during medium and low reservoir periods (Bureau of Reclamation, 1991).

2.2.2.4 Outlet Works

The outlet works would consist of 2 structures as described above. One structure would have a variable depth port between 765 and 720 feet msl. The second would have a fixed low level outlet at 650 feet msl. Stored water would be withdrawn from different zones (between 650 and 760) in the reservoir to optimize fisheries enhancement (flows and water temperatures). This configuration would allow blending of flows between the 2 structures to achieve water temperature control, although irrigation, municipal and industrial water supply, and flood control do not require temperature control. All releases would be suitable for aquatic life. (Bureau of Reclamation, 1991).

Oregon State law (Oregon Revised Statutes - ORS 540.350) requires that provisions be made on all new water storage projects for future hydroelectric development. In response to this requirement, a 42-inch diameter stub-off pipe and shutoff valve would be located at the downstream toe of the dam, near the outlet works stilling basin. With the present design, future construction of a small powerplant could be accomplished without major modifications to the project.

2.2.2.5 Water Distribution System

Lands that are included in the project service area would meet 3 criteria:

- They are classified as irrigable according to the Bureau of Reclamation criteria.
- Douglas County requires that the lands had to be serviceable from either a gravity pressure pipeline or directly serviceable from Elk Creek.
- In order to be serviceable from Elk Creek, the land needs to be within 1 mile of Elk Creek and require no more than 150 feet of pump lift.

The project would release most of the stored water through a gravity pressure pipeline to the Yoncalla and Scotts Valleys areas for irrigation, municipal, industrial, rural domestic, and anadromous fish uses. The cost of all needed water treatment

facilities would be borne by the users. Irrigation water would be supplied seasonally while all other water would be supplied year round or as required. Water would be supplied to users in lower Elk Creek by pumping directly from Elk Creek. Figure 2-3 shows the location of the proposed 19.6-mile pipeline system. The pipeline diameter at the head of the system would be 30 inches. Pipe diameter would decrease to 6 inches in service areas near the end of the system. All water delivery points from the pipeline would be metered (Bureau of Reclamation, 1991).

Water taken directly from Elk Creek by irrigators would be pumped through 2 to 8 inch pipelines and be distributed to sprinkler systems.

2.2.2.6 Drainage System

Irrigation return flows are anticipated to be 19 percent of delivered water volume (Douglas County Water Resources Survey, 1991). A fund would be established to provide on-farm drainage, if needed.

Installation of the drainage system for irrigation return flows would be a future project feature as indicated by ground water levels. It would be funded as needed from the County through sale of irrigation water (Myers, 1992).

An irrigation return flow system (sub-surface drainage system) would involve networks of 6 inch perforated tubing placed in a dendritic pattern in each irrigated field, to allow for the collection of soil moisture excess to crop root needs. The pipe would be buried in a trench 2 feet wide and up to six feet deep. If drainage is supplied to all irrigated lands in the service area, then up to 15.6 acres of land could be disturbed. Areas which may require sub-surface drainage systems are shown below:

Area	Acres	Feet of Pipe per Acre	Total Pipe Length (feet)	Width of Trench (feet)	Acres Disturbed
Yoncalla Valley	748	264	197,472	2	9.1
Upper Elk Creek	248	194	48,112	2	2.2
Scotts Valley	428	185	79,180	2	3.6
Lower Elk Creek	145	102	14,790	2	0.7
Totals	1,569		339,554		15.6

Source: Myers, 1992

The perforated pipe would be surrounded by a gravel envelope. The trench would be backfilled and excess soil windrowed along the route of the trench. Spacing of the pipe would depend upon the hydraulic conductivity of the particular field. Drain outlets

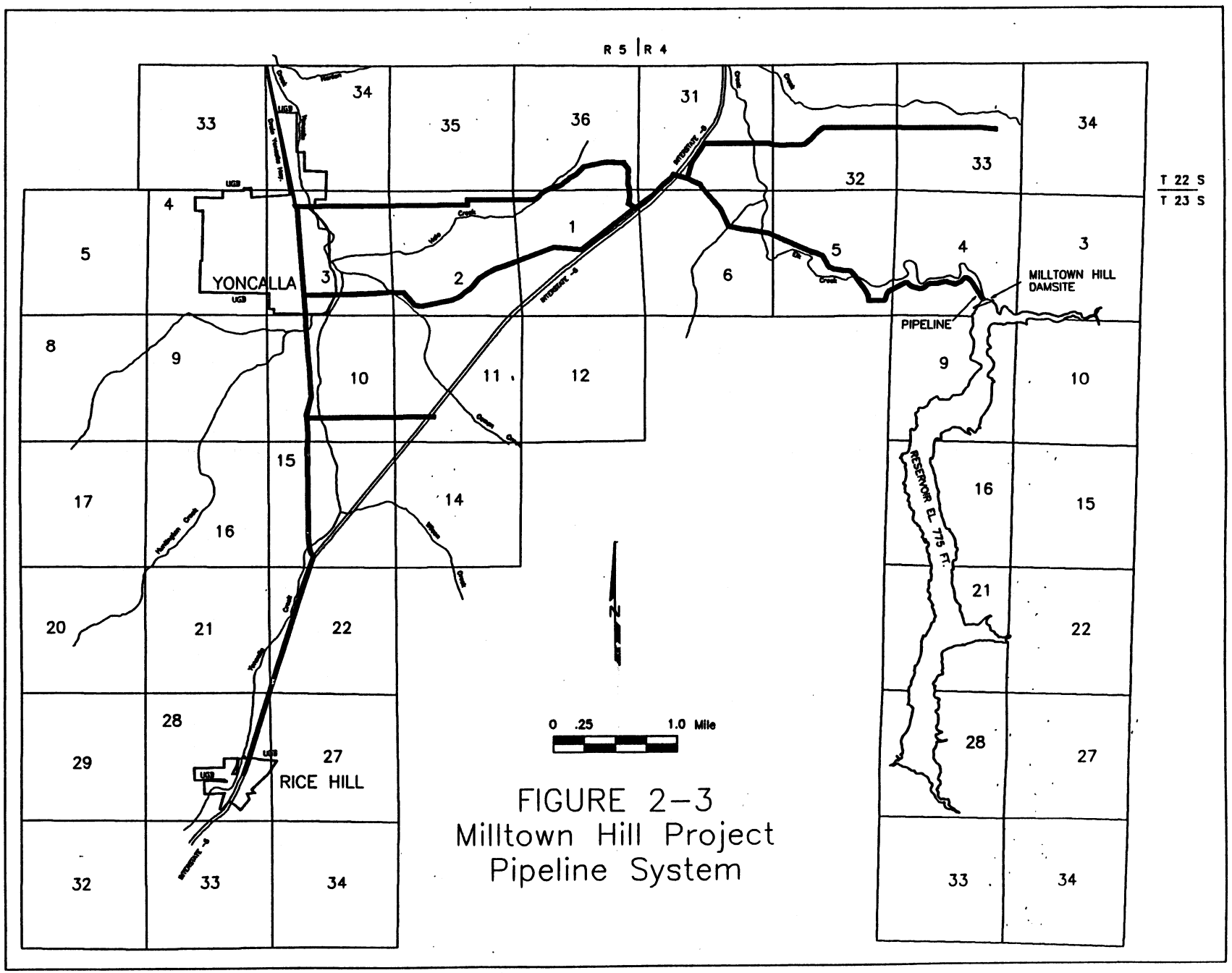


FIGURE 2-3
Milltown Hill Project
Pipeline System

would be placed to discharge water into existing surface waterways whenever possible. If the drainage pattern for a field prohibits the above, an outlet conduit would be located at the lower end of the drain field and extended to the nearest natural drainage for discharge.

Irrigation uphill from a particular field could cause sub-surface water to move into the root zone of a lower field. An interceptor drain would be provided in these instances. It would consist of the same type of perforated tube in a sub-surface gravel envelope at a depth suitable to intercept the water and transport it to an outlet to an existing surface water channel. These conditions could occur in the easterly draws of Scotts Valley and along Elk Creek in tributary valleys.

Typical outlet works would range from a horizontal pipe protruding from the bank of an intermittent waterway, to small concrete or rip-rap head- and wing-walls enclosing the horizontal pipe outlet to a "major" creek channel.

Some lands not now irrigated would require grading of portions of a field that are not jurisdictional wetlands to prevent intermittent surface ponding and aggravation of root-zone excess moisture conditions. Such surface drainage improvements would consist of filling depressions and constructing broad, shallow v-shaped waterways such that normal agricultural equipment operation would not be disrupted, to transport water off a field to an existing drainage channel. The gradients of these waterways would be designed well below rates that would produce erosion under all flow conditions. Sod could be placed in the waterways, as a further erosion reduction aid.

No project drainage or change in agricultural practices would occur to negatively affect jurisdictional wetlands. This would be enforced by County with a wetland protective clause in the water service contract between the County and individual water user. This would be discussed with the water user at the time the water service contract is negotiated.

2.2.2.7 Roads

The reservoir would inundate about 3 miles of Elkhead road and Scotts Valley road. A new service road would be constructed into the base of the damsite (Figure 2-2). About 3 miles of Elkhead Road (County Road #7) which traverses the western rim of the reservoir, would be affected. This road, which carries about 300 cars per day, extends about 15 miles from the I-5 intersection at milepost 154 to a junction at the Driver Valley Road near the city of Oakland. The road would be relocated at approximately 785 feet msl, less than 1/8 mile west of the present location. Elkhead Road would provide access to a recreation area on the northwest side of

the reservoir.

The reservoir would also affect the Scotts Valley Road (County Road #8). This road begins at a junction with the Elkhead Road near Interstate 5 and swings to the east and then to the south where it again joins the Elkhead Road near the south end of the proposed reservoir (Figure 2-2). This road, which carries about 100 cars per day, has about 4 miles of paved surface and 5 miles of all-weather gravel surface. The south end of the Scotts Valley Road would be re-aligned to join the existing Elkhead Road. A causeway would connect the east and west sides of the reservoir.

A 1-mile maintenance road would be constructed from the present Elkhead Road (near the present site of the county rock stockpile) to the downstream side of the dam. The road surface would consist of crushed rock on a 14-foot wide right-of-way. This road right-of-way would also include a 7-foot utility corridor right-of-way for the 30-inch pipeline and a powerline to the dam.

2.2.2.8 Utilities

Construction of the dam and the reservoir would require relocating four utilities and installation of a new powerline. Sprint long distance telephone lines (fiber optic), Douglas Electric Cooperative power lines, and Pacific Power and Light Company's three main power lines would be affected.

Telephone lines are currently buried within County Road rights-of-way. These lines would be moved at the utility's costs when the road is relocated. Douglas County notified Sprint of the proposed dam and reservoir at Milltown Hill when it installed its long-distance line, and the company agreed to move the line at its own expense should the dam be constructed.

Douglas Electric Cooperative currently has its powerline along County Road #7 right-of-way on the west side of the reservoir. The utility would place a new powerline down the west side of the reservoir along the new road right-of-way.

Pacific Power and Light Company has one 115 kilovolt and two 230 kilovolt lines crossing the southern end of the reservoir. One 230 kilovolt line will be replaced in 1992 by a 500 kilovolt line. The County would construct an island which would act as a base for transmission towers in the south end of the reservoir area (Figure 2-2). Steel transmission towers would be built on each side of the reservoir to support the lines as they span the reservoir. This arrangement would allow sufficient clearance above the reservoir for safety purposes. The material for the island would be taken from an upland area west of the proposed island.

A new 3-phase powerline would be required to provide power to

the control structure at the dam. The powerline would be built in the road right-of-way for Dark Canyon Road (Figure 2-2). The line would be about 1 mile long.

2.2.2.9 Microwave Tower

A microwave tower would be sited on Milltown hill in the NW1/4 NE1/4, Section 9. T.23S.,R.4W. (Figure 2-2). The structure would be a 60 feet high self-supporting tower at an elevation of 1139 feet msl. Electronic equipment would be located in a building about 10 X 15 feet and 8 feet high. Site power would be provided by a spur from the existing 115 KV line which parallels County road 7. The microwave tower would allow project monitoring and control from Roseburg, and also improve FAA and local law enforcement agency communications systems (Motorola Microwave Field Engineering, 1990).

2.2.2.10 Recreation Facilities

Two recreation areas would be constructed at the reservoir site (Figures 2-2 and 2-4). These recreation areas would be designed for day use only. The primary recreation area would be located on the southeast side of the reservoir near the location of the realigned County Road 8. Overburden from the dam site would be placed and shaped on the site to improve it. The site would be landscaped for appearance and utility purposes. This site would include parking facilities for 133 single vehicles or 53 single vehicles and 40 vehicles with trailers. The site would have 28 picnic sites that include 1 or 2 tables and 1 firebox each. The picnic area would also include 1 garbage can and 1 fountain with hose bib for every 4 sites. The site would include a 32-foot by 84-foot pavilion with restrooms in one end. A restroom would be located near the boat ramp. The boat ramp would be 55 feet wide, constructed of concrete, and would have a trolley type launching dock (Horn, 1990).

A site on the northwest side of the reservoir, would include parking, a boat ramp, a picnic area, and sanitation facilities. Parking facilities would have space for 52 single vehicles or 29 vehicles with trailers and 4 single vehicles. The boat ramp, a 50-foot-wide concrete feature with a trolley type launching dock, would be extended to provide access during periods of extreme drawdown. The picnic area would consist of 7 sites with 1 garbage can and 1 fountain with hose bib for every 4 sites. Each picnic site would have 1 or 2 tables and 1 firebox. Sanitation facilities would consist of pit toilets. This recreation site would be considered the secondary recreation area although it would provide the most direct access from I-5, and would be more useable as annual drawdown progresses.

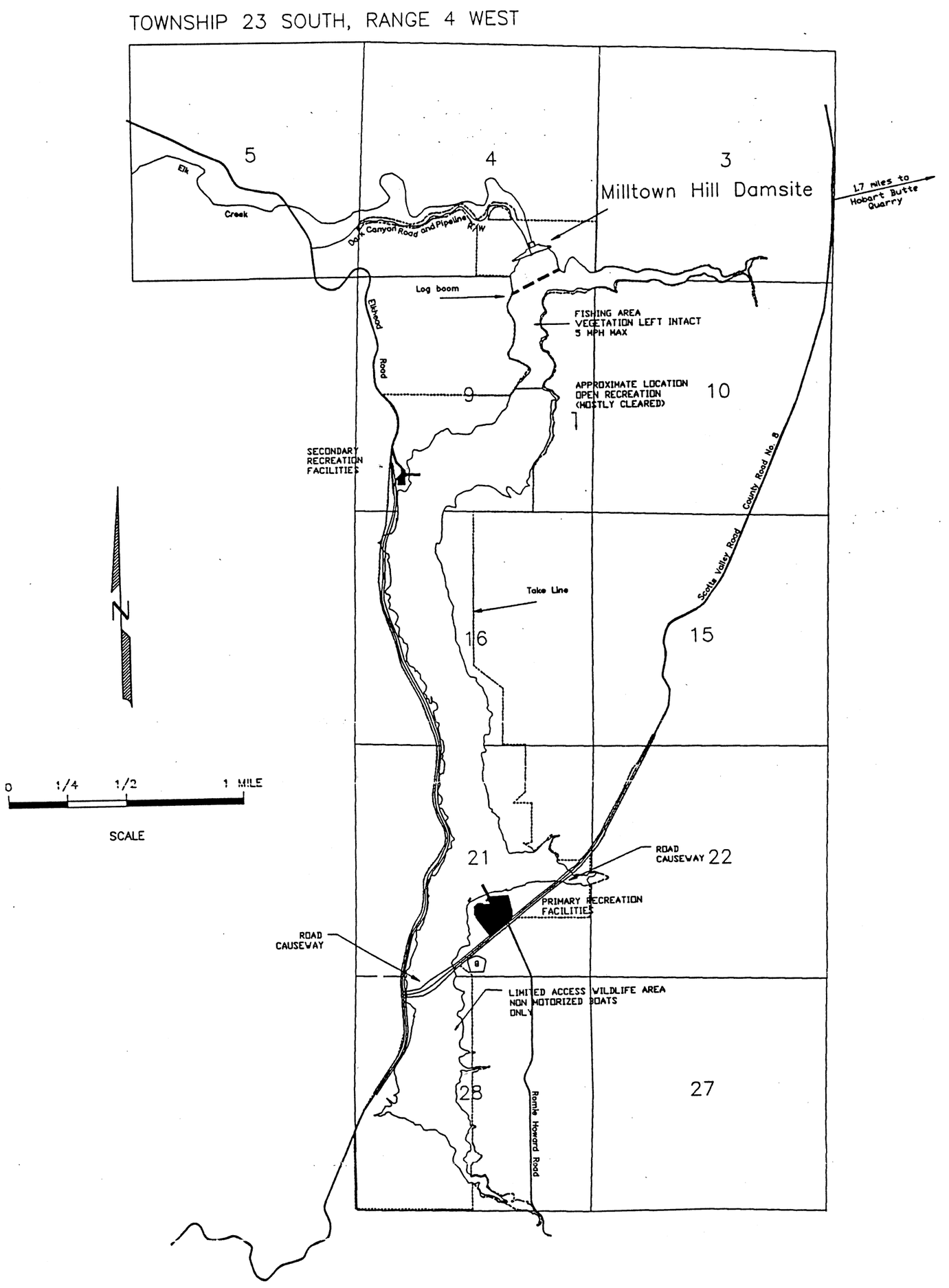


FIGURE 2–4
Milltown Hill Project
Recreation Facilities

Both sites would be furnished with underground electrical power and handicapped access (Horn, 1990).

2.2.2.11 Other Facilities

2.2.2.11.1 Quarry

The County would use the on-site Otten Quarry, (Figure 2-2), in Section 16, T.23S.,R.4W. This site is about 15 acres and extends from elevation 800 to 1,100 msl, with most of the area between 900 and 1,000 msl. It is about 200 horizontal feet from the 775 foot level of the pool. About 300,000 cubic yards of rock would be extracted and moved to the contractor work area for processing into various sizes necessary for incorporation into the roller-compacted concrete (RCC) mix for construction of the dam. Although about 98% of the sand necessary will be produced from crushing activities on-site, it will be necessary to transport about 2% from existing commercial mining operations. The Hobart Butte Quarry is an optional source of rock. It is located on Bureau of Land Management land about 1.7 miles east of County Road #8 (Figure 2-2). If the Hobart Butte site is selected, Douglas County in consultation with the Bureau of Land Management would prepare a mine development plan and address impacts for NEPA compliance.

2.2.2.11.2 Contractor Work Area

A contractor work area would be required for various activities (Figure 2-2). The work area would be used for processing the rock to a final aggregate for the processing plant. Aggregate would be stockpiled in the contractor's work area or in the staging area. The rock would be crushed to sizes desired and washed, if required, to remove fines. The washing process would include 2 or 3 ponds placed in series to allow the fines to settle. The size of the ponds would be from 1/4 to 1 acre in size. Periodic releases of less than 1/2 cfs of water would be necessary for exchange water. Prior to discharge, from the second or third pond, wash water would be filtered through straw bales, or similar filter material, to remove suspended material. Other purposes of the contractor work area would be for storage of materials, location of field offices, and parking of vehicles and construction equipment.

2.2.2.11.3 Staging Area

The contractor would develop a staging area for project activities (Figure 2-2). The primary facility would be the RCC batch plant. Aggregate for use in the batch plant would be stockpiled in the staging area or in the contractors work area,

depending on the contractor's operation. The RCC mix would be prepared at the staging area and delivered by conveyor or truck to the dam.

2.2.2.11.4 Construction Haul Road

A haul road would be constructed to move overburden materials from the dam site to the southern end of the reservoir for the purposes of reshaping the primary recreation site on the south end of the reservoir (Figure 2-2). It would also be used to move construction materials to and from the dam site and other construction areas. The road would consist of a graded, stabilized and maintained haul road located mainly on the east side of Elk Creek for most of the length of the reservoir pool. It would be located between 300 and 1,300 feet from Elk Creek except for 3 stream crossings.

2.2.2.11.5 Elk Creek Crossings

Three crossings of Elk Creek would be required along the construction haul road. The exact locations have not been defined and would depend on the configuration of the contractors work area. They would be constructed by placing a rock fill across the creek. Temporary culverts would be placed to allow passage of summer flows. The culverts would be removed before high flow winter months.

2.2.2.11.6 Recreation Areas

The construction of the dam would require removal of approximately 100,000 yards of overburden materials, consisting mainly of soils from the dam abutments. These soils would be hauled via the construction haul road to the south end of the reservoir where they would be used to form and contour the primary recreation area (Figure 2-4). Overburden materials from the Otten Quarry, about 50,000 cubic yards, would be used at the recreation site and to level the contractor's work area.

2.2.2.11.7 Causeways for County Road #8

The main causeway for County Road #8 would be about 1,300 feet long (Figure 2-2). It would require about 150,000 cubic yards of material composed of earth and rock fill. The material would come from the excess rock and earth extracted for the road excavation for re-alignment of County Road #7. Two culverts, each 8 feet in diameter, would be installed.

The causeway across Lane Creek on the southeast side of the reservoir would be about 300 feet long. It would require about

25,000 cubic yards of material composed of earth and rock fill from the excess available from the County Road. A 7-foot diameter culvert would be installed.

2.2.2.11.8 Transmission Line Island

The island and its access road would be constructed from excess material from the road as described above (Figure 2-2). About 20,000 cubic yards of material would be required for the access road and 55,000 cubic yards would be required for the island. The island would occupy 3 acres at the base. It would have side slopes of 4 to 1 and extend from elevation 760 msl to elevation 781 msl. The top of the island would be flat to provide the base for the transmission towers. The top would be about 0.75 acres (100 X 325 feet).

2.2.2.12 Land Acquisition

The maximum surface area of the reservoir would be 681 acres, however the project would require 1,192 acres within the project take-line (Figure 2-2) as follows:

Land Use	Acres
Flood easement	221
Wildlife mitigation	235
Roads	6
Wetlands	23
Recreation	27
Reservoir	681
TOTAL	1,192

Approximately 90 acres of public land and 1,102 acres of private land are needed. The project area would affect a total of 31 properties of which the Bureau of Land Management controls 3 and Douglas County owns 5. Douglas County would acquire all or part of the remaining 23 parcels except where management covenants may suffice. Acquiring the properties would involve 8 to 10 dwellings which would be handled in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 and amendments. Property required for the take-line is greater than that which would be inundated for the following reasons:

- Additional area at 780 feet msl is required to handle flood events that could inundate lands above the spillway crest elevation of 775 feet msl.

- Federal policy requires that sufficient land above the high water line be taken for operation and maintenance of the project.

- County policy requires a public land buffer around a government owned facility to control access.

- Some blocks of land bordering the reservoir would be acquired for recreation purposes and for wildlife mitigation.

- Relocation of Elkhead Road (County road #7) and Scotts Valley Road (County road #8).

- Construction of the Dark Canyon Service Road to the damsite.

- Construction and operation of a microwave facility.

2.2.2.13 Mitigation of Impacts to Biological and Cultural Resources

"Mitigation" refers to those efforts taken to lessen the adverse impacts caused by construction and/or operation of the project.

2.2.2.13.1 Reservoir Area Wildlife Habitat

The project would include several actions taken in the reservoir area to mitigate wildlife losses (Figure 2-5). These actions would include measures for both terrestrial and aquatic wildlife.

The project would include acquisition and management of approximately 235 acres of land adjacent to the southern end of the reservoir area for terrestrial wildlife mitigation. These lands would be protected and managed to increase wildlife habitat, but would not involve measures which would require intensive operation and maintenance. Improvements would include the cessation of livestock grazing to allow recovery of native plants. The area is currently fenced. Vegetative plantings of mast producing plants would be made along field edges and fence rows to form a buffer, provide cover, and produce food. Snags would be developed in coniferous stands, and nest boxes and platforms would be provided to improve nesting habitat for several bird species.

An additional 50 acres of snags and nest box development would occur on lands in the takeline area. This would include wood duck boxes on the Walker Creek arm of the reservoir. Goose nests and

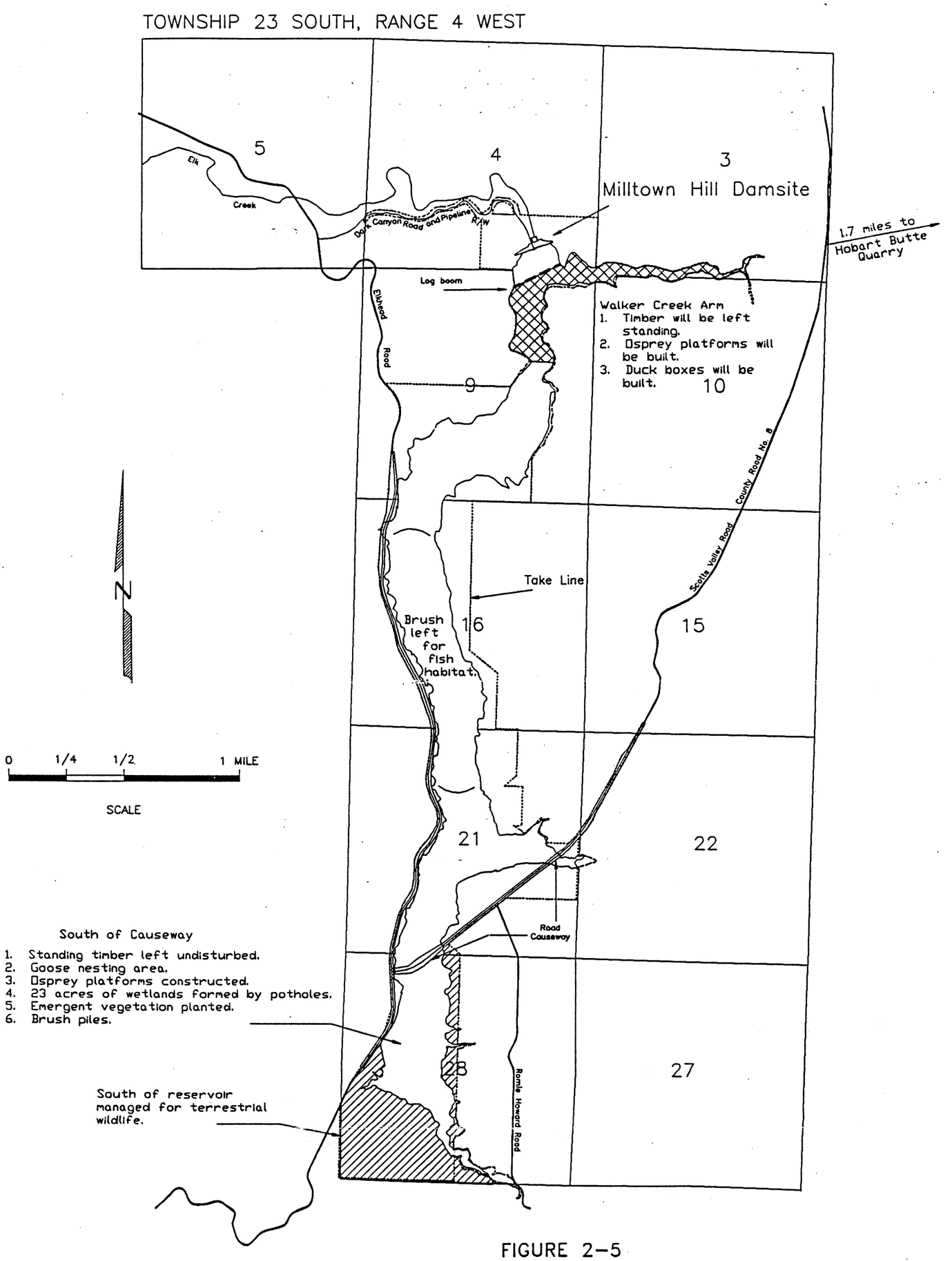


FIGURE 2-5
MILLTOWN HILL PROJECT
WILDLIFE AND FISHERIES MITIGATION

osprey platforms would be constructed in several areas.

2.2.2.13.2 Wetlands

The plan proposes the development of about 23 acres of permanent, shallow-water wetlands at the upstream end of the reservoir south of the County Road 8 causeway (Figure 2-6). These wetlands would be formed by scooping out shallow depressions in flat areas that would normally be dewatered during summer drawdown. The excavated material would be used to create low berms adjacent to the shallows. The berms would be treated to protect them from erosion and would be planted with herbaceous and woody vegetation tolerant to inundation.

The purchase of a 3-acre log pond that was discussed in the DEIS for the project will not be part of the project as planned. A decision to remove the log pond from the project was made after further investigation by Douglas County determined that water quality in the log pond was not as anticipated based on prior conversations, and that a considerable clean-up liability may be incurred if the pond was part of the project. This decision to remove the log pond from the project does not deter Douglas County's desire to use the log pond for development of a recreational and wildlife facility, but it is in Douglas County's best interest to pursue it separately from the Milltown Hill Project. Also, there may be additional funding sources available (for clean-up) if the log pond is not part of the project.

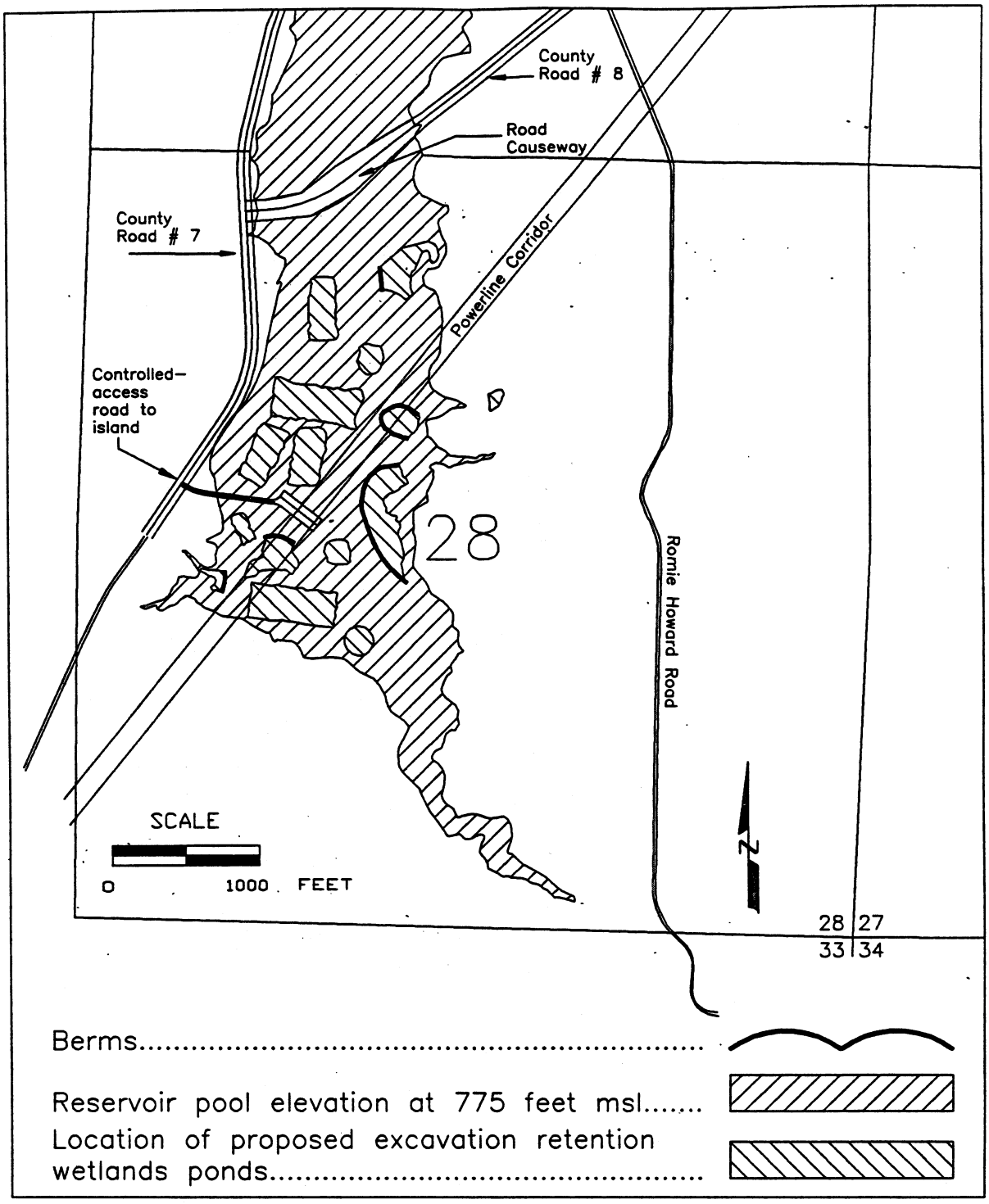
2.2.2.13.3 Habitat for Black-tailed Deer and Turkey

The County would secure 767 acres of habitat for the Federal endangered Columbian white-tailed deer. Habitat would be secured off-site to mitigate for loss of 681 acres of black-tailed deer and turkey habitat. The 767 acres would be a portion of the 5,500 acres of Columbian white-tailed deer habitat required by the recovery plan for delisting. This off-site mitigation measure for lost game species values was developed by biologists representing the Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Douglas County, and Bureau of Reclamation. About 2,000 acres of secured habitat exists on Federal, County and State lands.

2.2.2.13.4 Cultural Resources

Historic structures evaluation and test excavations for historic and prehistoric sites would be completed prior to project construction to determine if they are eligible for listing to the Natural Register. Means to avoid or reduce the adverse project effect would be investigated. Adverse effects would be mitigated

TOWNSHIP 23 SOUTH, RANGE 4 WEST



MILLTOWN HILL PROJECT
PROPOSED WETLANDS AREA, SOUTH OF ROAD CAUSEWAY

FIGURE 2-6

through data recovery. SHPO and the Advisory council on Historic Preservation would be consulted for review and approval. A Memorandum of Agreement (MOA) for impact mitigation actions would be signed by Reclamation, Douglas County, the SHPO, and the Council.

2.2.2.14 Enhancements to Biological Resources

"Enhancement" refers to those efforts taken for long-term improvement of existing biological conditions during construction and operation of the project.

2.2.2.14.1 Stream Flow Improvements for Fisheries Resources

The project would store water during high flow periods in late fall, winter, and early spring to meet downstream needs during the irrigation season (April 1- October 30) and for anadromous fish enhancement. Releases would be made for the purposes of municipal and industrial water supply and fish enhancement throughout the year. Irrigation releases would be made during the irrigation season only.

Storage of up to 7,737 acre-feet of water would be reserved each year for fisheries resources. This water would be used to augment instream flows and provide cooling water to maintain water temperatures within an acceptable range for fisheries resources during summer and fall months. During these months, water temperatures are normally above 65-75 degrees (F) in most portions of Elk Creek. Releases of water at the dam would increase flows in the mainstem during the naturally low flow period of summer and early fall. With control over the temperature of the released water, the cooler water and increased flows would substantially improve rearing habitat for anadromous fish in the mainstem of Elk Creek below the dam. In addition, the Yoncalla Valley pipeline would be used to deliver water to the lower 2.5 miles of Yoncalla Creek for stream flow enhancement during the same low flow period.

2.2.2.14.2 Instream Fish Habitat Improvements

Log or gabion structures would be placed across Elk Creek in certain areas to trap gravels for spawning purposes. Due to the lack of natural gravel recruitment, some gravel may need to be placed along with the gravel holding structures. Approximately 8,000 square feet of gravel would be placed between river miles 39.4 and 34.4, 33,000 square feet of gravel between river miles 34.4 and the mouth, and 4,000 square feet of gravel in the lowest reaches of Adams and Yoncalla Creeks (Figure 2-7). Gravel deposits would be one foot in depth.

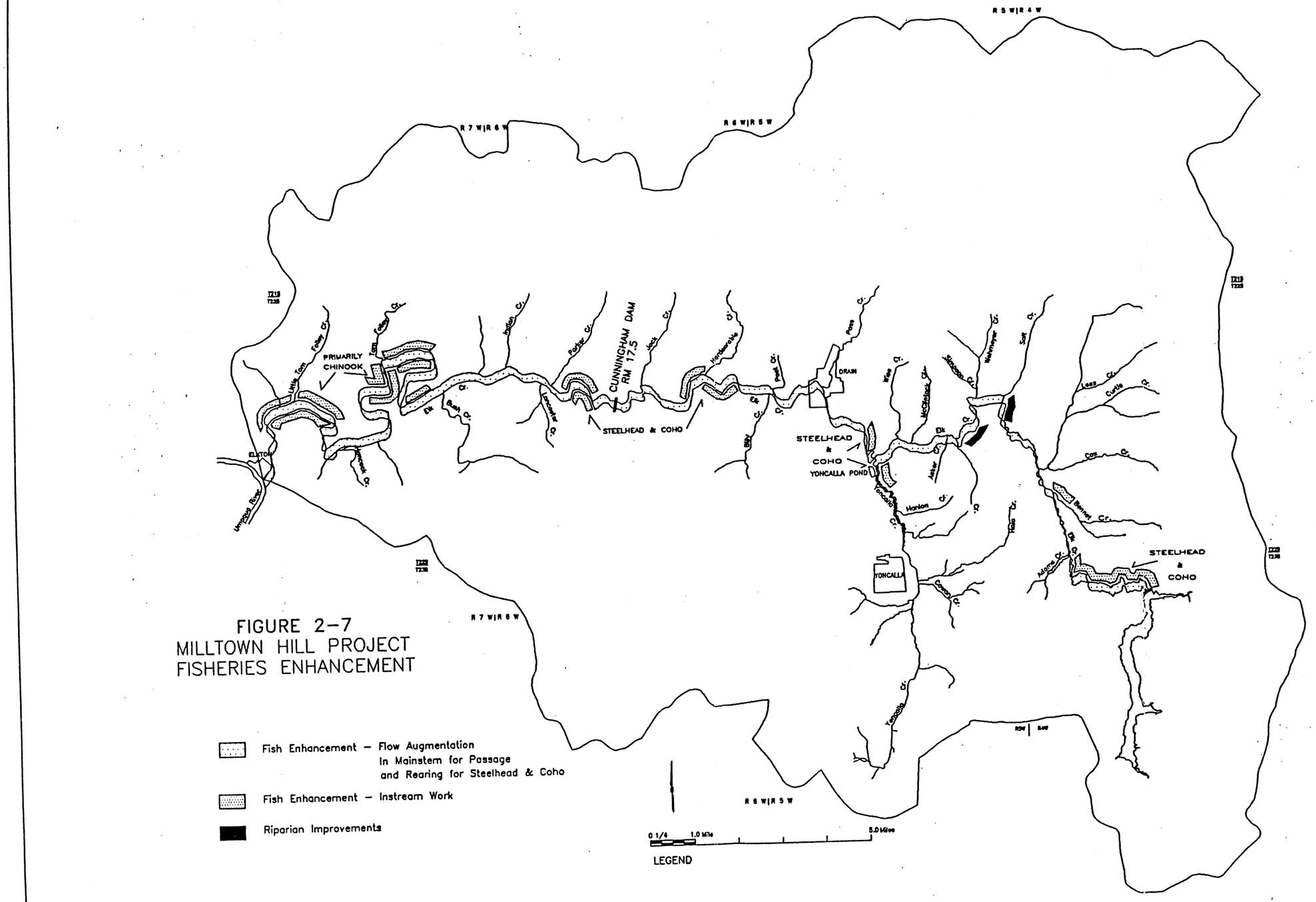


FIGURE 2-7
MILLTOWN HILL PROJECT
FISHERIES ENHANCEMENT

- Fish Enhancement – Flow Augmentation In Mainstem for Passage and Rearing for Steelhead & Coho
- Fish Enhancement – Instream Work
- Riparian Improvements

2.2.2.14.3 Reservoir Fish Habitat Improvements

Several actions would be taken to ensure good habitat for reservoir fish (Figure 2-5). These actions include leaving timber standing on about 90 acres on the Walker Creek arm of the reservoir and in the northern portion of the reservoir. Timber would also be left standing south of the County Road #8 causeway. Brush piles would be left in the central pool area. In addition, brush piles, tree stumps, and other woody debris would be placed in the main pool area and south of the County Road #8 causeway. Emergent vegetation would be planted in the southern end of the reservoir for habitat enhancement.

2.2.2.14.4 Riparian Habitat

The project would include measures to evaluate improvement to about 1.5 miles of riparian habitat along Elk Creek below the dam to mitigate for losses upstream of the dam due to inundation. Areas in need of habitat improvement are located between Scotts Valley and Boswell Springs and in the Putnam Valley area. Improvements would include vegetative plantings and fencing to protect the existing or improved riparian areas from livestock grazing (Figure 2-7).

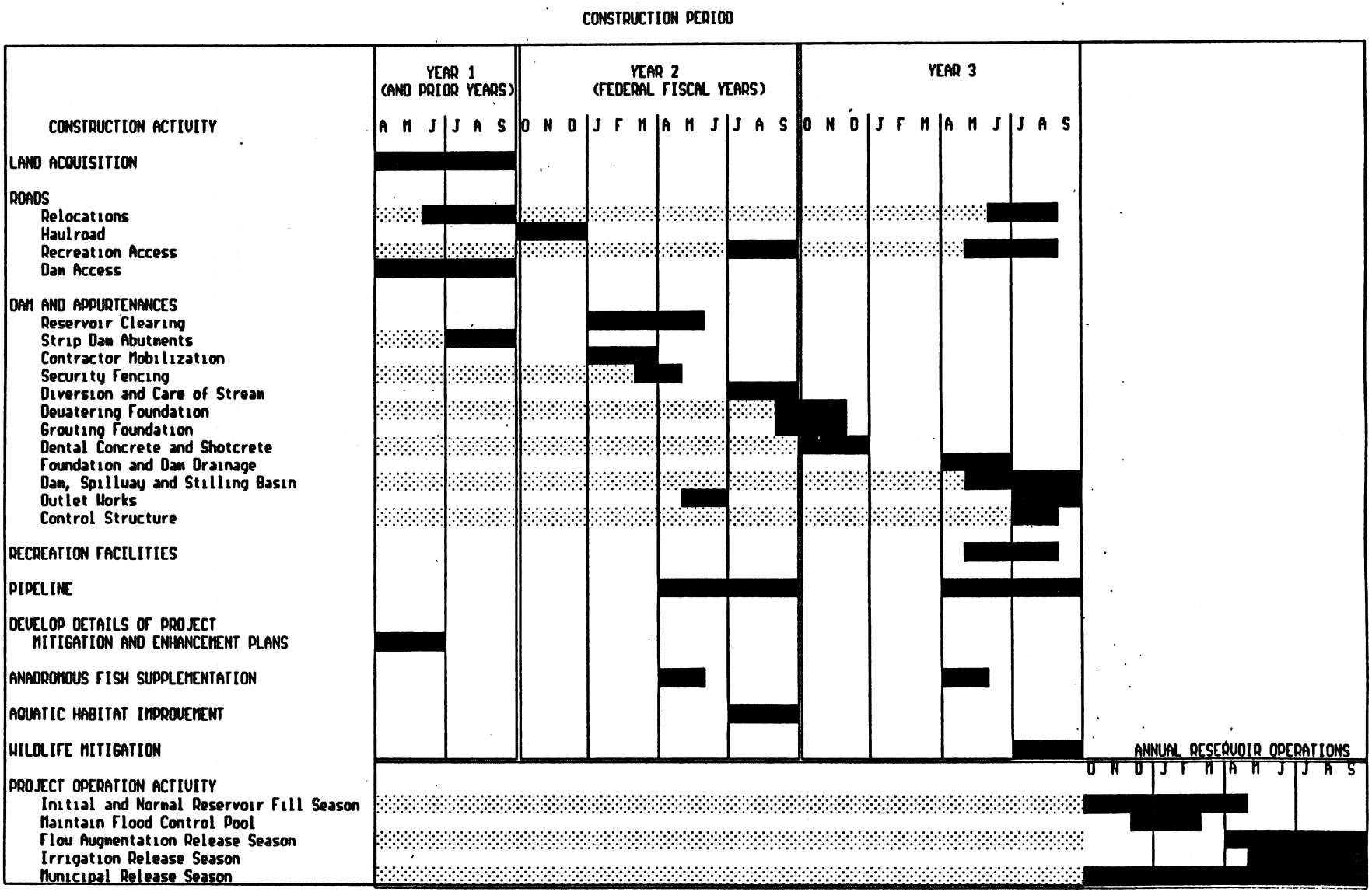
2.2.2.15 Construction Schedule and Work Sequence

Douglas County would complete construction of the Milltown Hill Project in three years (Figure 2-8). Operation would begin in year four.

During 1991, some work was completed on the relocation of portions of County Road #7 (Elkhead Road) and County Road #8 (Scotts Valley Road) near the southern end of the proposed reservoir area. The work was undertaken by Douglas County to accommodate construction of a new Pacific Power & Light 500 kV power transmission line through the area and to provide access to a new homesite for a family that would eventually be displaced by construction of the dam and reservoir. Powerline construction is scheduled to begin during the fall of 1991. Much of the material excavated from the new road realignment cuts was placed for the power transmission tower island located in the upper reservoir area. This work represents some of the road relocation scheduled for year 1 construction in Figure 2-8.

Figure 2-8 does not reflect about a year's worth of lag time between construction year 1 and 2 which will be needed for processing of the Small Reclamation Projects Act loan application plus final approval of Federal funding.

Figure 2-8. Construction and Operations Schedule for Milltown Hill Project.



During year 1 and prior years the following activities have been and would be done:

- Acquisition of rights of way and properties
- Removal of acquired buildings
- Strip dam abutments
- Relocation of County Roads #7 and #8
- Construction of the access road to the downstream side of the dam
- Development of mitigation and monitoring plans

During year 2 the following construction activities would occur:

- Complete aquatic habitat improvement
- Begin anadromous fish supplementation
- Clearance of reservoir to 780 feet msl
- Development of mobilization and construction program
- Construction of the haul road in the reservoir area
- Construction of access road to recreation sites
- Construction of diversion works
- Dewater foundation
- Construction of security fence
- Begin grout foundation
- Complete dental concrete and shotcrete
- Begin dam, stilling basin and outlet works
- Implement monitoring plans
- Begin pipeline network

During year 3 the following actions would be taken:

- Complete construction of access road to recreation areas.
- Complete foundation and dam drainage
- Complete dam, spillway and stilling basin
- Complete outlet works
- Complete pipeline network
- Complete anadromous fish supplementation
- Continue implementation of monitoring plans
- Complete road relocations
- Complete dewatering of foundation
- Complete grouting foundation
- Complete recreation facilities
- Complete wildlife mitigation

During operation of the project, mitigation monitoring efforts would continue as required and committed to in the FEIS (See: Appendix B).

2.2.2.16 Project Costs

The total estimated capital cost of the Milltown Hill Project, based on January, 1990 cost levels plus an allowance for projected price increases would be $41,748,600 (Table 2-2). This total includes, in addition to direct construction costs, reasonable allowances for contingencies, investigations, engineering, acquisition of lands, County overhead and legal fees, reimbursable interest during construction and Bureau of Reclamation participation.

Table 2-2. Summary of Estimated Project Costs.

Total Direct Cost			$28,500,100
Contingencies @ 10.00%			1,425,000
Subtotal			29,925,100
Projected cost increase			712,000
Subtotal			30,637,100
Engineering and Administration			5,740,600
BASE CONSTRUCTION COST			**36,377,800**
RIDC			697,900
Rights of Way			2,727,500
Bureau Participation			310,000
Application Processing		65,000	
Loan Administration		245,000	
TOTAL CONSTRUCTION COST			**40,113,200**
Deferred Drainage			425,400
Loan Application Reports			804,000
TOTAL PROJECT COST			**41,748,600**
Less COUNTY CONTRIBUTION			10,700,000
Rights of Way		2,168,000	
Loan Application Reports		424,200	
Filing Fee		5,000	
Deferred Drainage		425,400	
Other (Cash & Services)		7,677,400	
TOTAL FEDERAL SHARE			**31,048,600**
oan			24,532,8000
Grant			5,817,900
Rights of Way	559,500		
Construction	4,472,700		
Loan Applic & Spec Studies	785,000		
RIDC			
Less RIDC			(697,900)
TOTAL LOAN OBLIGATION AND GRANTS			**30,350,700**
Less USBR Prior to Loan			(60,000)
FEDERAL APPROPRIATION REQUIREMENT			**30,290,700**
Less USBR Loan Administration			(245,000)
TOTAL FUNDS TO BE ADVANCED BY U.S.			**30,045,700**

Source: Myers, 1992.

2.2.2.16.1 Projected Future Costs

On the basis of recent trends, the cost of construction can be expected to rise above current levels. Allowances of 2 percent per year have been included to accommodate escalation expected to occur between the time of the estimates and start of construction.

2.2.2.16.2 Land Acquisition and Rights of Way

A total area of 1,192 acres would be acquired by Douglas County for Milltown Hill Reservoir and road relocations. Pipeline routing would be located within rights of way for either State or County road rights of way, consequently, no rights of way costs are included for the pipeline. A right-of-way permit will be required for BLM public domain and revested Oregon and California Railroad Grant Lands (O&C lands).

The cost of acquisition of all properties and rights of way for the project is estimated to total $2,727,500, including contingencies and price increases.

2.2.2.16.3 Engineering and Administration

Douglas County has entered into a memorandum of understanding (MOU) with the Bureau of Reclamation to provide design service. An additional MOU describing construction inspection and administration services, is being negotiated. These costs, exclusive of SRPA program costs, are estimated to be:

MOU costs for preparation of dam designs and specifications	$2,283,000
MOU costs for construction administration	2,000,000

Douglas County has retained J.M. Montgomery Consulting Engineers, Incorporated for preliminary and final design, and specification preparation. For the dam and control structure at the base of the dam, an amount of $4,283,400 has been included for these services. The county also would retain a consultant for design and construction administration for the recreation facilities. Road design and construction inspection is to be accomplished by engineers of the County's Public Works Department. Project engineering and administration costs are shown below:

FEATURE	AMOUNT
Road Relocation	$373,200
Dam and Control Structure	4,283,400
Pipeline	1,000,000
Recreation	84,050
Total	$5,740,650

Total engineering and administration costs are about 11.8% of total project costs exclusive of Reimbursable Interest during construction.

2.2.2.16.4 Estimated Direct Cost of Project Facilities

A summary of the estimated direct cost of project facilities are shown below:

FACILITY	COST	SOURCE
Road & Utility Relocation	$3,110,000	County
Dam & Appurtenances	20,898,340	USBR/JMM
Distribution System	5,400,970	JMM
Recreation Facilities	840,490	County
Wildlife Mitigation	358,840	County
Aquatic Habitat Improve.	28,510	County
Project Total	$30,637,150	

2.2.2.16.5 Loan Application Reports and Special Studies

During the course of formulation of the Milltown Hill Project, Douglas County spent $399,000 for general project planning. The county accomplished investigations and studies to further define the potential specifically for anadromous fish enhancement in the amount of $142,200 and $4,500 for recreation facility concepts. Costs for preparation of the Loan Application and Environmental Reports are estimated to total $258,300. These total $804,000.

2.2.2.16.6 Bureau of Reclamation Costs

During design and construction of the project, the Bureau of Reclamation would incur costs from activities pertinent to the administration of the Small Reclamations Project Act program, such as loan application review and processing, repayment contract preparation, design review and construction oversight. The overall costs have been estimated to be $305,000, of which $60,000 is for application processing and $245,000 for loan administration.

2.2.2.16.7 Reimbursable Interest During Construction (IDC)

During the construction period interest charges (IDC) would accumulate on costs incurred and/or funds advanced by Bureau of Reclamation. The accumulated total is included in the repayment schedule calculations. The portion of IDC related to water use for purposes other than commercial irrigation is considered reimbursable, and over the repayment period is expected to total $697,900 (Myers, 1992).

2.2.2.16.8 Operation, Maintenance and Replacement Costs

The Milltown Hill Project would be operated by the Douglas County Water Resources Survey as part of the continuing Douglas County Water Resources Program. Major elements of the program include:

- Cooperative stream gaging with the U.S. Geological Survey and the State of Oregon.
- Cooperative Snow Surveys with the U.S. Department of Agriculture.
- County stream gaging program.
- County/National Weather Service Rain Gage Network.
- Dam safety inspections, including use of county-owned equipment for monitoring inclinometers.
- Planning activities for selection and implementation of additional projects.
- Assistance to local entities in solution of water resource problems.
- Cooperation with the state of Oregon District 15 Watermaster's Office.
- Reservoir operation and maintenance of Galesville and Berry Creek projects.
- Cooperation with the Corps of Engineers for flood control of reservoir releases.

Funds for all the activities of the Water Resources Survey are provided through the Public Works budget and only those costs deemed to be directly attributable to Milltown Hill are expected to be borne by water users (Myers, 1992).

The project would be operated from the operations center in the County Courthouse in Roseburg. Other county projects, such as Galesville, are operated through the Water Resources Survey/Watermaster's Office. Diversions would be administered by the District 15 Watermaster and staff. Customer billing, project accounting, and fiscal services would be accomplished by the administrative staff, coordinated by the Deputy Director. The above activities would be incorporated into the work loads of existing staff. Costs would not accrue to project water users for these functions.

Inasmuch as dam safety is an ongoing program, costs for this activity for the Milltown Hill Project would not be broken out or allocated to the project, but would continue to be included in the overall Water Resources budget. Communication costs between Milltown Hill and the control center would not be charged to water users (Myers, 1992).

Routine minor maintenance and incidental operation duties at Milltown Hill Reservoir would be accomplished by the staff of Douglas County's Water Resources Survey, and by a full-time attendant. The cost of the full-time attendant would be shared between the project and the Douglas County Parks Department. The project would then be responsible for one half the employee cost, at an estimated annual amount of $12,000. The attendant would perform minor maintenance duties at the dam, estimated to require about one-half the employee cost to the project. Maintenance needs at the dam of a more serious nature would be met on a scheduled basis, or as-needed, utilizing men and equipment from the County Road and/or County Park Department crews.

The resident attendant also would perform periodic operation and maintenance inspections of the pipeline. This is estimated to require the one-half of the attendant's time. The county plans to retain a contractor, equipped to perform maintenance on the pipeline, on an on-call basis. The estimated cost for pipeline maintenance is estimated at an annual workload of 100 hours at a cost of $75 per hour, totaling $7,500 annually. Maintenance costs are estimated to total $19,500 payable by the project. Of this total, the pipeline functions would be responsible for an estimated total of $13,500 and the dam and reservoir share would amount to $6,000.

Item	Dam	Pipeline	Total
Operation	$ See Text		----
Maintenance	$ 6,000	$ 13,500	$ 19,500
Replacement	$ 5,070	0	$ 5,070
Total O+M+R	$ 11,070	$ 13,500	$ 24,570

Source: Myers, 1992

A sinking fund amount is estimated for one item, the Systems Control and Data Acquisition (SCADA) equipment, to be installed in the Control Structure at the base of the dam. The total capital cost of the equipment is estimated to be $70,000, according to JM Montgomery estimates of "probable bid price". A life of ten years has been assumed for the equipment, with complete replacement at the end of that time. It is assumed that Douglas County would be able to manage sinking fund amounts to receive an interest income amounting to 7% over this period. The annual sinking fund deposit

required to completely replace the SCADA gear at the end of ten years is $5,066 (Myers, 1992).

Douglas County would establish, prior to the beginning of project operation, an emergency reserve in the amount of $40,000.

2.3 Compliance with Applicable Laws, Regulations, and Executive Orders

2.3.1 Reviews, Permits, and Licenses

Reviews, permits, licenses, and other regulatory compliance presented in Table 2-3 would be required by Federal, State, and local agencies for the construction and operation of the proposed project. Douglas County would apply directly to all agencies that require permits and licenses.

2.3.2 Compliance with Executive Orders for Flood Plain Management #11988 and Protection of Wetlands #11990

The Draft Environmental Impact Statement of the proposed project was used to elicit public review and comment as required by Executive Orders 11988 and 11990 and Reclamation's implementation procedures.

In response to Executive Orders 11988 and 11990, Bureau of Reclamation has addressed the following specific issues in the Draft and in the Final Environmental Impact Statement.

1. Reason why the proposed action must be located in the flood plain or wetlands.

Dams and reservoirs, by their very nature, must be located in flood plains to impound surface water. Associated structures that might be damaged by flooding, such as the relocated road, would be located outside the flood plain. Other facilities would be designed to withstand flooding.

Scattered, small patches of seasonal wetlands, having emergent vegetation, occur in the irrigation areas (approximately 28 acres). Douglas County would notify landowners of the locations of these wetlands. No project drainage or change in agricultural practices will occur to negatively affect jurisdictional wetlands at the time the water service contract is negotiated. This will be enforced by County with a wetland protective clause in the water service contract between the County and individual water user.

Table 2-3. Reviews, Permits and Licenses Required by Federal, State and Local Agencies.

Agency	Act or Regulation	Requirement	Procedure for Compliance
Environmental Protection Agency	National Environmental Policy Act (NEPA)	Environmental Impact Statement (DEIS)	Submit USBR's EIS to EPA. -Prepare FEIS, submit to EPA -Issue decision notice
Advisory Council on Historic Preservation	National Historic Preservation Act, Sec. 106 Executive Order 11593, Sec. 2 (b) (36 CFR 800)	Compliance with provisions of the Act and Executive Order	Preliminary consultation with State Historic Preservation Office (SHPO). SHPO reviews EIS through A-95 Clearinghouse procedure.
National Park Service	National Historic Preservation Act, Sec. 106 Executive Order 11593, Sec. 2 (b) (36 CFR 800)	Compliance with provisions of the Act and Executive Order.	Agency reviews EIS
National Marine Fisheries Service	NEPA, Fish and Wildlife Coordination Act	Compliance with provisions of the Acts	NMFS cooperates with USBR in preparation of anadromous fisheries components of EIS. Review DEIS for adequacy

Table 2-3. (Continued)

Agency	Act or Regulation	Requirement	Procedure for Compliance
U.S. Fish and Wildlife Service	Endangered Species Act, Fish and Wildlife Act of 1956, Fish and Wildlife Coordination Act, Fish and Wildlife Improvement Act, Migratory Bird Conservation Act, Bald Eagle Protection Act, NEPA	Compliance with provisions of the Acts	Request listing of endangered and threatened species; consultation. USFWS cooperates with USBR in preparation of EIS. Review DEIS for adequacy Completion of the Fish and Wildlife Coordination Act Report (August, 1990).
Bureau of Land Management	Federal Land Policy and Management Act of 1976 (FLPMA)	Compliance with Provisions of the Act	BLM is a cooperating agency.
	FLPMA and 43 CFR 2800	Easement or permit for use of BLM public domain land	Submit application.
	Revested Oregon & California Railroad and Reconveyed Coos Bay Wagon Road Grant Lands Act of 1937	Easement or permit for use of O & C lands	Submit application. Review DEIS for adequacy
Corps of Engineers/Oregon Division of State Lands	Section 404 (Joint permit with Oregon Division of State Lands)	Dredge and Fill Permit for dam, reservoir, and fish enhancement work	Submit application to Corps and DSL. Review DEIS for adequacy. The Corps is a cooperating agency.

Table 2-3. (Continued)

Agency	Act or Regulation	Requirement	Procedure for Compliance
Oregon Department of Environmental Quality	Federal Water Pollution Control Act Amendments of 1972, Sec. 401	Water Quality Certificate	Submit application to DSL and Corps of Engineers. Review DEIS through A-95 clearinghouse procedure.
Oregon Division of State Lands	Removal/Fill Permit (Joint Permit with Corps)	Dredge and Fill Permit for dam, reservoir, and fish enhancement work	Submit application to DSL and Corps of Engineers
Oregon Department of Forestry	ORS 527.611 or 527.730	Forest Practices Act	Apply for permit to operate machinery on forest land. Meet or exceed standards to protect water quality. Review DEIS through A-95 clearinghouse procedure
Oregon Department of Water Resources	ORS 537	Water rights for storage use of stored water and for construction purposes.	Submit application. Public hearing and Water Policy Review DEIS through A-95 clearinghouse procedure
	ORS 540.350 to 540.390	Dam safety review and inspection	Submit plans and specifications.

Table 2-3 (Continued)

Agency	Act or Regulation	Requirement	Procedure for Compliance
Oregon Department of Land Conservation and Development	ORS 197	Review of County land use actions for compliance with statewide goals.	Review initiated by appeal to Land Use Board of Appeals. Document Findings of Fact.
Douglas County	Comprehensive Plan and Zoning	Plan and Zone Amendment	Submit application. Planning Commission hearing. Board of Commissioners action to approve plan amendment.
	Development ordinance	Building Permit	Submit application.

2. Facts considered in making the determination to locate in the flood plain or wetlands.

The benefits of supplying M&I and irrigation water as well as flood control benefits and instream flows would outweigh the harm to natural and beneficial values of flood plains.

There are ample opportunities to replace lost values to wetlands by developing wetlands in the upper part of the reservoir.

3. Statement on whether the proposed action conforms to applicable state or local flood plain or wetland protection standards.

The proposed project should conform to state and local standards for protection of public facilities within the 100-year flood plain. It would comply with the Statewide Planning Goals and Guidelines, as excepted, including Goal 5 (wetlands) and Goal 7 (flood plains).

4. Statement on whether the action affects the natural and beneficial value of the flood plain and wetlands.

Dam construction and operation would have both positive and negative effects. However, the positive effects would outweigh the negative effects. Operation for flood control would help prevent losses of public and private lands historically subject to flood damage. It would also narrow the downstream 100-year flood plain, making some lands more suitable for human use and habitation.

A consequence of flood control, however, is long-term elimination of the seasonal flooding that deposits nutrients, organics, and sediments that temporarily accelerate, until it reaches a new equilibrium, due to lowered deposition of sediments trapped by the dam.

Wetlands would not be converted to agricultural lands when additional irrigation water becomes available. Wetland loss in the area of reservoir inundation would be mitigated.

5. Steps taken to design or modify the proposed action to minimize harm to or within the flood plain or wetlands.

The design would take into consideration the need to protect the dam from the probable maximum flood, as well as to protect downstream properties.

6. Restoration of flood plain and wetland values, if applicable to the proposed action.

Flood plain values would be at least partially offset by the enhancement of riparian areas downstream of the dam. Wetlands lost in the inundation area of the reservoir would be offset by the creation of wetlands in the upper end of the reservoir.

2.4 Other Alternatives Considered but Excluded from Detailed Study

2.4.1 Structural Alternatives Investigated

The following storage sites were explored (Clair Hill and Associates, 1968, 1969, 1971; International Engineering, 1978 and 1980), including the preferred alternative, on tributaries to Elk Creek and Elk Creek mainstem (Figure 2-9). A summary of findings for each alternative is listed in Table 2-4.

2.4.1.1 Tributaries to Elk Creek

Billy Creek. This site, also called Skull Mountain site, is located on Billy Creek, approximately 1/2 mile south of its junction with Bear Creek (Section 24, T. 22S., R. 6 W.). This site has an 80,000 acre-foot capacity. However, precipitation records indicate the drainage area yield would not exceed 28,000 acre-feet. The Scotts Valley and Yoncalla Valley service areas would not be served, due to high pumping costs. Therefore, the site was dropped from further investigation. The city of Drain subsequently developed a 290-acre-foot reservoir on Bear Creek, a tributary of Billy Creek.

Adams Creek. This site is located on Adams Creek, approximately 1/2 mile from its confluence with Elk Creek (Section 6, T.23S., R 4W.). Preliminary geological investigations indicate this site may be structurally suitable for a dam which would store only 2,000 acre-feet although 1,500, 3,500 and 6,800 acre-feet sites were evaluated. This small watershed would not yield enough water for all the service areas and the costs per acre-feet were excessive, therefore the site was dropped from further investigation. At present, the city of Yoncalla has a permit for the diversion of 1.5 cfs of water from Adams Creek. This water is pumped to Wilson Creek, then piped 4 miles and stored in a 100 acre-foot reservoir near Yoncalla.

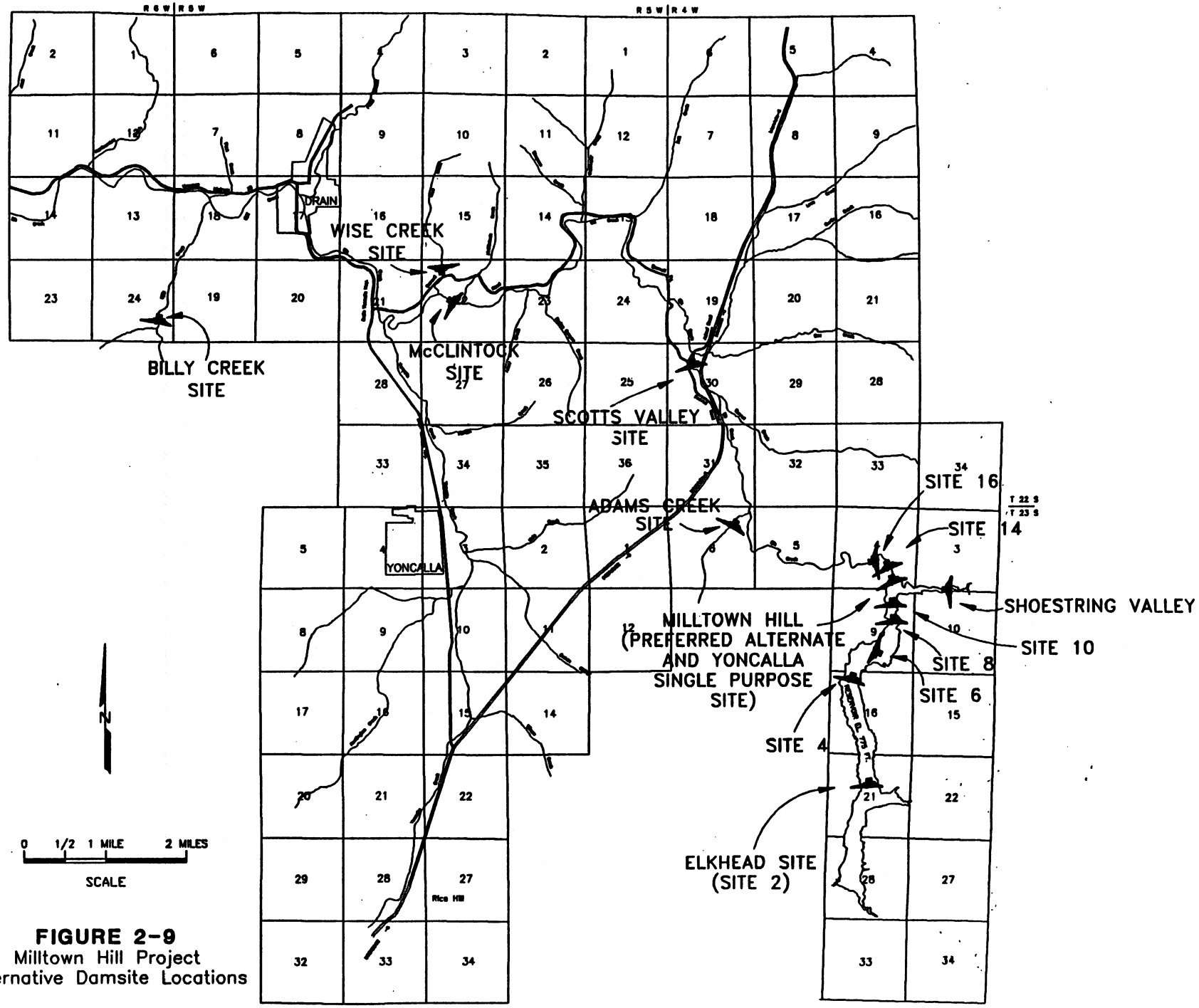


FIGURE 2-9
Milltown Hill Project
Alternative Damsite Locations

Table 2-4. Structural and Non-structural Alternatives Investigated.

ALTERNATIVES	FINDINGS
1. Structural	
A. Sites Located on Elk Creek Tributaries	
Billy Creek	-Insufficient water yield -High costs of pumping water to service area in Scotts Valley and Yoncalla Valley.
Adams Creek	-Small yield -Geological conditions would provide for a reservoir of only 2,000 acre-feet; not adequate for service area needs.
Wise Creek	-Inadequate yield. -Slide potential on both abutments.
Shoestring Valley (Walker Creek)	-Yield of only 12,500 acre-feet. -Larger reservoir would be cost prohibitive.
B. Sites Located on Elk Creek Mainstem	
Drain (McClintock)	-Would inundate Scotts Valley service area. -Prohibitive costs of I-5 relocation. -Loss of Scotts Valley service area. -High cost of pumping to service areas in Yoncalla Valley.
Scotts Valley (Elk Creek)	-Would inundate Scotts Valley service area. -Would inundate I-5. -Loss of Scotts Valley service area. -High cost of pumping to Yoncalla Valley service area. -High cost of I-5 relocation
Yoncalla Single Purpose	-Unacceptable to local Douglas County Water Resources Management Plan and the Oregon Water Resources Commission's Basin Program Statement. Would service Yoncalla Valley only.
Site 2	-Inadequate reservoir capacity.
Site 4	-Inadequate reservoir capacity.
Site 6	-Geologically inadequate.
Site 8	-Geologically inadequate.
Site 10	-Geologically inadequate.
Site 12 (Preferred Alternative)	-Meets all needs of service areas. Geologically acceptable
Site 14	-Geologically inadequate.
Site 16	-Geologically inadequate, working room for dam construction not adequate.
C. Other Structural	
Interbasin Transfer	-Institutional constraints. -Inadequate water supply.
Ground Water Pumping	-Inadequate water supply. -High pumping costs.
2. Non-Structural	
Purchase of irrigation	-Counter to diversification of water employment base. -Would apply to Drain only because Yoncalla would have no source.
Conservation	-Active Conservation programs are in effect.

Wise Creek. This site is located on Wise Creek, approximately 2 miles southeast of Drain (Section 22, T.22S.,R.5W.). The site was dropped from further investigation due to slide potential on both abutments and inadequate water yield.

Shoestring Valley. This site is located on Walker Creek approximately 1/2 mile from its confluence with Elk Creek. (Section 10, T.23S.,R.4W). Initial investigations indicated the average yield for this reservoir would not exceed 30,000 acre-feet. More detailed studies showed that the storage capacity could be only 12,500 acre-feet. The physical formation of the area provides for only an 80-foot structure, capable of storing only 12,500 acre-feet. A larger structure would be cost prohibitive.

2.4.1.2 Elk Creek Mainstem

Drain. This site, also called the McClintock site, is located on Elk Creek, approximately 4 miles upstream of the town of Drain (Section 22, T.22S.,R.5W.). Potential storage capacity is 220,000 acre-feet, but the average yield would not exceed 115,000 acre-feet. A reservoir at this site would inundate the entire Scotts Valley service area and a 2-mile segment of Interstate 5. Relocation of approximately 4 miles of I-5 would be required. The costs of the relocation of I-5, and the cost of pumping water to the Yoncalla Valley service area, plus the loss of the Scotts Valley service area, indicated the site did not warrant further investigation.

Scotts Valley. This site, also called the Elk Creek site, is located on Elk Creek, at river mile 33.5 (Section 30, T.22S.,R.5W.). Potential storage capacity is 100,000 acre-feet, with an annual yield of 75,000 acre-feet. This site would inundate Interstate 5, but not to the extent the Drain site would. It would also inundate most of the Scotts Valley service area. Cost of highway relocation, pumping cost to the Yoncalla Valley service area, and loss of Scotts Valley service area, plus the possibility of leaks in both abutments indicated the site should not be further investigated.

Yoncalla Single Purpose. This alternative is located in Section 4, T.23S.,R.4W at the same site as the preferred alternative. It differs from the preferred alternative in that it would provide only 5,350 acre-feet solely for municipal and industrial use in the Yoncalla - Rice Hill area. This alternative was dropped from further study after local interests determined it

unacceptable, since it addressed only a portion of their needs.

Elk Creek Dam Axis Alternatives. A reconnaissance investigation identified 8 potential dam sites in the upper reaches of Elk Creek. Three sites were in Section 4. They were site 12 (Milltown Hill), site 14, and site 16. Three sites were in Section 9. They were site 6, site 8 and site 10. One site was in Section 11 (Elkhead site, site 2). One site was in Section 16, T.23S.,R.4W. (site 4). Area capacity curves were developed for 5 of these sites. Estimates were made of volumes of materials required for a typical dam, using a normal water surface elevation of 800 feet msl for each of the five sites. Two sites failed to meet the criteria. Three sites, including the preferred alternative site were further inspected for geological foundation conditions. The Milltown Hill alternative had the most favorable material for structural adequacy for dam foundation, permeability, and related problems concerning spillway and outlet construction, and availability of materials for embankment (Table 2-3).

Reclamation and County decided to limit future studies to the preferred alternative. All structural alternatives which involved a reservoir capacity less than desired were considered not acceptable, and they were dropped from further investigation, since they would not provide enough water to meet County goals and the needs of the subbasin.

2.4.2 Other Structural Alternatives

Two additional alternatives were investigated. An investigation revealed that ground water supplies are inadequate for the future needs of the service areas (USGS, 1977), and pumping costs would be prohibitive. An interbasin diversion of water was also considered. This alternative would involve the transfer of water from the Coast Fork Willamette River, near London, to the Elk Creek drainage. Investigations indicated the supply of water is inadequate and the cost of either a tunnel or a pumping facility as well as a diversion structure would be prohibitive.

2.4.3 Non-Structural Alternatives

Non-structural alternatives considered were water conservation and retirement of irrigation land. The purchase of irrigation water would be counter to the effort the county is making toward providing greater opportunities to diversify its employment base. The cities of Drain and Yoncalla are unique for their size. They have implemented conservation measures such as metered water

supplies and both cities maintain active conservation programs. Further conservation measures would not appreciably increase available water supplies and would still be unresponsive to the long-term goals of the county, the cities, and the farming communities of Elk Creek subbasin.

2.5 Comparison of Environmental Impacts of Alternatives

The preferred alternative and the no-action alternative are compared in Table S-2 in the Summary section. A more in-depth analysis is presented in Section 3, Affected Environment and Environmental Consequences.